
CADD Hardware and Software

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CADD Hardware and Software

Note:

This condensed version of CADD PRIMER is intended to give you an overview of CADD. It includes only important topics from CADD PRIMER. It does not include any diagrams. CADD PRIMER includes more than 100 diagrams that illustrate the working of CADD. For complete understanding of CADD refer to CADD PRIMER. This complete book is available for download for \$9.95 at <http://www.caddprimer.com> or you can order printed copies through the publisher listed at the end of this chapter.

About this Chapter

This chapter provides a general overview of CADD hardware and software. There are three main topics in this chapter:

- *CADD Hardware*
- *CADD Software*
- *CADD User Interface*

CADD Hardware describes the physical components of a CADD system such as system unit, memory and hard disk. It introduces the requirements and specifications necessary for CADD equipment.

Note: If you are familiar with computers, you may want to browse through the CADD Hardware topic to re-familiarize yourself with information referred to in later chapters. If you are unfamiliar with computers, you should read the entire topic before proceeding.

CADD Software describes the main functions of a CADD program, such as drawing, editing, data output, system control, data storage and management and other special features.

CADD User Interface describes how to interact with CADD by various means of data entry. You will learn how commands are entered using the menus, keyboard, toolbars, etc.

Key Terms in this Chapter

Term	Definition
Bit, byte, megabyte (MB), gigabyte (GB)	A bit is the smallest unit of electronic memory. The second smallest unit of memory is a byte, which contains 8 bits. One megabyte contains one million bytes. 1000 megabytes make one gigabyte.
Data exchange format (DXF)	A standard format used to exchange electronic drawings between different CADD programs.
Digitizer	An electronic data input device.
Dots per inch (dpi)	A specification of printers and plotters that determines how accurately they can print.
Dot-pitch	The distance between the picture elements (pixels) on the screen.
Graphical user interface (GUI)	An environment established by the program that uses graphic clues to help the user communicate with the computer.
Hardware	The physical components of a computer.
Mainframe system	Large computer that processes data at very fast speeds and has a lot of memory. Used by large organizations.
Megahertz (MHz)	The speed of data processing. The speed of one million cycles per second is called 1 MHz.
Minicomputer	Smaller version of the mainframe system. Also used by large organizations.
PC	Personal computer, also known as a microcomputer.
Resolution	The sharpness of the image on the screen.
Server	A computer dedicated to running the network program, with computers connected via a network.
Software	The programs that run on the computer.

Hardware and Software Overview

There are two parts of a computer system, hardware and software, and a CADD system is no exception. Computer hardware is the physical components of the computer such as system unit, monitor and plotter. Computer software is the program that determines the application of a system.

There are three main categories of computers with respect to hardware:

- Mainframe
- Minicomputer
- Microcomputers, for example personal computers (PCs)

Mainframe computers have a lot of data processing power and their size is quite big. A single mainframe computer performs all the data processing and is accessed via terminals connected to it. Minicomputers are smaller versions of mainframe computers. Microcomputers (PCs) are the desktop or laptop computers of today and are used for individual computing needs.

There are two main categories of computer software:

- System software
- Application program

The system software manages the internal operations of the computer. The application programs are tools that help you accomplish your work, such as CADD. (This topic is further described in CADD PRIMER)

CADD Hardware

The following are the main hardware components of CADD:

- System unit
 - Central processing unit
 - Memory
 - Hard disk, floppy disk, CD-ROM
- External storage devices
- Monitor
- Printers and plotters
- Keyboard
- Digitizer, puck and mouse

System Unit

The system unit is the computer that is used for all data processing. The main components of the system units are the central processing unit (CPU) and memory. In mainframe and minicomputers CPU and memory are usually separate compartments that house thousands of devices. In today's PCs, however, they all fit in a small box commonly known as a desktop computer. Most desktop computers today come equipped with a hard disk, floppy disk drive and CD ROM. Let's have a look at the components of a system unit:

- Central processing unit
- Memory
- Hard disk, floppy disk, CD-ROM

Note: The above topics are described in detail in CADD PRIMER.

External Storage Devices

There are a number of external storage devices available such as magnetic tapes, zip drives and removable hard disks. They are commonly used to keep backup copies of electronic files for safekeeping.

Magnetic tapes are quite common for storing large volumes of data. A magnetic tape that looks like a small videocassette can store thousands of megabytes of data. However, they are quite slow and require a lot of time to store or retrieve data.

Zip drives were introduced recently; they use zip disks to store data. A zip disk is like an upgraded version of floppy disk that can store about 100MB of data. They are particularly helpful if you plan to use CADD or other graphic programs that generate quite big data files. You can store an entire project on one zip disk that could take 50 or more floppy disks.

Another new option for data storage is the removable hard disk. You can remove the entire hard disk from your computer and use it on another computer. This approach is commonly used when you need to work on different computers and you want the same information to be available instantly.

The Monitor

The monitor is the computer screen and is used to display information. A good monitor is very important for CADD in order to display fine graphics. A color monitor is essential because many CADD drawing techniques are based on colors. Monitors are available in various sizes ranging from 13" to 30" or more. Today, average monitors have the ability to display millions of colors.

The main factor that determines the quality of a monitor is the resolution. The term resolution refers to sharpness of an image displayed on the screen. Resolution is measured by the number of picture elements (pixels) that a screen can display. The more pixels and the closer they are, the sharper the image. The distance between pixels is called the "dot-pitch". The smaller the dot-pitch, the sharper the image. A .26 or smaller dot-pitch monitor is recommended for CADD applications.

Printers and Plotters

CADD drawings are printed using fine-quality printers and plotters. Drawings are neat and clean and as accurate as the naked eye can see. You can print drawings at as much as 1200-dpi (dots per inch) accuracy. This means 1200 dots are printed in a one-inch-long line! All the text, dimensions, and other graphics are printed highly accurate, neat and crisp. You can print drawings with a lot of variations; for example, drawings can be printed with different sizes, line types, text fonts and colors.

There are a variety of printers and plotters available in the computer industry. They work on different principles and their prices vary significantly. There are

many types of pen plotters, ink-jet printers, laser printers and plotters, electrostatic printers, etc.

Printers and plotters range in cost from as little as \$200 to as much as \$20,000. The less expensive ones are not as accurate and are commonly used for rough prints. Professional drawings, however, are printed only by using fine printers and plotters. For more information on printers and plotters, refer to Chapter 8 *Printing and Plotting*."

Digitizer, Puck and Mouse

The digitizer (also known as a graphic tablet) and the puck are the data input devices most commonly used in CADD systems. These devices allow you to enter point locations on the screen and to make selections from the menus. As the puck is moved over the surface of the digitizer, it moves the indicator (cursor) on the screen relatively. To enter a point, you need to position the cursor at the appropriate position on the screen and then press the "Enter" button on the puck.

Digitizers are available in many sizes and styles. Fig. 1.3 (available in CADD PRIMER) shows an example of a digitizer used with CADD. A number of commands are printed on the digitizer surface. To enter a command, place the puck over the desired command and press the "Enter" button. The selected command is instantly entered. The puck buttons are configured to perform many other tasks. For example, one button is used to make selections, another to enter the data, another to return to the previous menu and another to cancel the last command.

A mouse is another pointing device that can be used with CADD. Like the puck, the mouse allows you to control the position of the cursor on the screen by rolling it across a flat surface, but it does not require a digitizer. Some programs support working with a mouse only, while others support both the mouse and the digitizer. A mouse is much cheaper than a digitizer or puck, but provides only limited data entry options.

A Typical CADD Network

A number of CADD workstations can be connected together by using a computer network. A computer network provides the ability to share both equipment and information. A CADD network is not only cost effective but it provides a great convenience in sharing information.

All the drawings and data can be stored in a common storage medium, which is accessible to all users. You can open any drawing from any workstation in the network and share it with others. This is impossible if computers are not connected in a network.

Note: This topic is further described in CADD PRIMER.

CADD Software

A CADD program contains hundreds of functions that enable you to accomplish specific drawing tasks. A task may involve drawing an object, editing an existing drawing, displaying a view of the drawing, printing or saving it, or controlling any other operation of the computer. The functions contain a number of commands that enable you to specify exactly what you want to do and how you want to do it.

The functions are organized into modules that provide easy access to all the commands. The program is divided into modules such as draw, edit, data output, function control, data storage and management. A program may also have a number of specialized functions such as layers, database and 3D. Lets have a look at the CADD modules:

- Draw
- Edit
- Data output
- System control
- Data storage and management
- Special features

Draw

The draw module provides access to all the drawing functions of CADD. Whenever you need to draw something this group of functions is used. The draw module enables you to draw lines, arcs, circles, ellipses, text, dimensions, symbols, borders and many other drawing components.

Draw is CADDs most frequently used module because all drawing work is accomplished using it.

Edit

The edit module lets you change existing drawing elements and manipulate them in a number of ways. You can move, copy or erase drawing components. You can enlarge or reduce the sizes of diagrams or change the color and line type of drawing components. You can also change the size and style of text and dimensions, as well as edit a dimension to show different units of measurement. A good CADD program is designed to change the appearance of all drawing elements created with CADD.

The edit functions also act as convenient drawing-aid tools. They enable you to join missing corners of lines, trim drawing components along a line, stretch them to fit a new shape, etc. The list of editing capabilities goes on and on. The edit functions make CADD a dynamic drawing tool.

Data Output

The data output module enables you to display drawings on the screen and then print them on paper. There are two separate sets of functions that help accomplish this:

- View-display functions
- Print/plot functions

The view-display functions allow you to display different views of a drawing on the screen. These functions are used quite often, because every time you need to draw something or edit something, you need to focus on that portion of the drawing. With the help of view-display functions, you can zoom in on a specific portion of the drawing.

The print and plot functions allow you to print drawings using a printer or a plotter. You can control many aspects of printing and plotting. You can print the same drawing in different sizes by applying the appropriate scale factor. You can plot the drawings with specific colors, pen thickness, and line types.

Data Storage and Management

The data storage and management module allows you to store and manage drawing data. Through the use of the functions in this module, you can store drawings as files on the hard disk. You can manage the files in directories and sub-directories, and move, copy or delete them as needed.

CADD data management functions also let you translate drawings created by other CADD programs. These functions convert drawing data to a generic format that can be read by any CADD program. Data exchange format (DXF) is one of the common data translation formats used by CADD programs. There are a number of data exchange formats available.

System Control

The system control module (also known as system defaults) allows you to control how CADD works. CADD programs are designed for a broad range of professionals, including architects, designers, engineers and surveyors. With the help of system control functions, you can set the working environment of CADD to suit your needs.

Example: You can set the type of units that you will be using, the accuracy of the units, a style for dimensions and text, colors, layers, line type in a drawing, etc. Additionally, you can customize screen menus, the display of colors on the screen, resolution of the screen, size, the speed of the cursor, etc.

You can also specify whether the selected defaults should apply to a single drawing, to a specific project, or to all the projects in a specific category. The defaults can be set on a temporary or permanent basis.

Special Features

CADD programs usually offer a number of special features that make working with CADD easier and allow you to automate many drawing tasks. For example, you can create layers in a drawing that allow you to segregate drawing components. You can develop spreadsheets and databases that can be used to create many types of project reports. You can create three-dimensional (3D) drawings, such as isometrics and perspectives, with the help of 3D functions. You can also accomplish many other automated tasks with the help of macros.

The number of special features a CADD program has or how elaborate they are varies from one program to another. Some vendors sell specialized features as separate packages, while others include them in a single package. It all depends how a program is written, how big or small it is, and how it is sold.

CADD User Interface

CADD user interface provides the environment and the tools that allow you and the computer to communicate. Each CADD program establishes an environment that best suits its purpose. The goal is to make working with CADD efficient. Most programs use a Graphic User Interface (GUI) to communicate with the user. The GUI provides visual aids for quick data entry. You are given tools to select functions, enter textual or mathematical data, locate points in the drawing window, select objects in the drawing window, etc.

The following are the most common ways to communicate with CADD. Refer to CADD PRIMER for details.

Using the Menu Bar

Entering commands in the command window

Using the tool buttons

Using the dialog boxes

Working in the drawing area

CADD PRIMER ordering information:

CADD PRIMER is available at 30% off the cover price when you order directly from the publisher at the address listed below or through the web site <http://www.caddprimer.com/discount30.htm>.

MailMax Publishing, 43-15 Judge St., Suite 1R, Elmhurst, New York 11373.

Voice mail: (212) 894-3748 Ext. 1039, E-mail: info@caddprimer.com

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